**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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| In the Matter of | |
| Expanding Flexible Use of the 3.7 GHz to 4.2 GHz Band | GN Docket No. 18-122 |
| Petition for Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3.7-4.2 GHz Band | RM-11791 |
| Fixed Wireless Communications Coalition, Inc., Request for Modified Coordination Procedures in Band Shared Between the Fixed Service and the Fixed Satellite Service | RM-11778 |

# Comments of Alaska Communications Internet, LLC


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**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
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## Summary

Alaska – one-sixth of the nation's land area – is dotted with isolated communities that lack access to infrastructure that most people elsewhere in the nation take virtually for granted. Many remote Alaska communities cannot be accessed from the state's core road system and are not connected to the state's power grid. To reach these communities, people, as well as goods and services, must arrive by plane, barge, snow machine, all-terrain vehicle, or other off-road transportation means.

Alaska Communications and its affiliates serve as the local wireline voice service provider for about 50 of these communities, roughly half of which depend on satellite connections to Anchorage to interconnect with global telecommunications and information networks. In addition, Alaska Communications serves schools, libraries, and rural health care providers throughout rural and remote areas of Alaska.

The Commission should exclude Alaska from any decision to introduce more intensive terrestrial use of the C-band satellite downlink frequencies at 3.7-4.2 GHz, because that spectrum supports vital connectivity to remote areas of Alaska that cannot be replicated by terrestrial facilities or satellite services in other bands. C-band satellite services are essential for providing Alaska customers with critical services, such as telehealth and distance learning, that require a high degree of uptime and reliability. Alaska's high northern latitude, forbidding terrain, harsh climate, and short construction season make construction of terrestrial connections difficult and extremely costly, at best. And, among the satellite service bands, C-band performs more reliably with superior coverage than higher frequency bands, such as Ku- and Ka-band. Ku- and Ka-band services do not function well at the low elevation angles below 10 degrees required in northern Alaska, and they are more susceptible to severe "rain fade" at those angles in poor weather, when the reliability of communications is at a premium.

Neither is the additional spectrum needed to meet Alaska's wireless broadband demands. Rather, as a result of Alaska's small population and low population density, existing spectrum allocations are more than adequate to meet the state's needs for the foreseeable future, even new "5G" mobile broadband services. Moreover, terrestrial mobile transmissions in this band would quickly overwhelm the ability of nearby C-band earth stations to receive downlink satellite signals.

Given the great public interest value of C-band satellite services in the state, and the difficulty of sharing this spectrum with terrestrial mobile entrants, the Commission should not disturb the *status quo* in Alaska at this time. To the extent the Commission decides otherwise, however, it is vital that it limit the amount of C-band spectrum it allocates for new terrestrial use, and establish a compensation mechanism for incumbent satellite earth station providers for their costs of mitigating the associated interference.

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## Comments of Alaska Communications Internet, LLC

Alaska Communications Internet, LLC ("Alaska Communications") hereby responds to the Commission's Order and Notice of Proposed Rulemaking in the above-captioned proceedings, seeking comment on whether and how to introduce new terrestrial mobile services in the 3.7-4.2 GHz band currently licensed for satellite C-band downlink (space-to-Earth) operations and terrestrial point-to-point microwave services.[1]

The Commission often has recognized the unique challenges of providing advanced communications services in Alaska. In light of Alaska's specific circumstances, the Commission should protect C-band fixed-satellite service ("FSS") in Alaska and exclude the state from any reallocation or sharing of the 3.7-4.2 GHz band for terrestrial mobile wireless broadband services.

C-band satellite services play a unique and essential role in connecting isolated Alaska residents to educational and healthcare resources, unlocking economic opportunity, and enabling participation in the civic and cultural fabric of the state, the nation as a whole, and, indeed, the

[1] *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Order and Notice of Proposed Rulemaking, FCC 18-91 (rel. July 13, 2018). These comments will refer to the two portions of the Commission's action as the "Order" and "NPRM," respectively.

larger world. The 3.7-4.2 GHz band supports vital connectivity to remote areas of Alaska that could not be replicated by services in other bands. Moreover, because of Alaska's small population and low population density, an additional allocation of terrestrial mobile spectrum in the 3.7-4.2 GHz band is not needed to meet the state's terrestrial wireless needs at this time, not even for new "5G" mobile broadband services. Given the great public interest value of C-band satellite services in the state, and the difficulty of sharing this spectrum with terrestrial mobile entrants, the Commission should not disturb the *status quo* in Alaska at this time.

## Background

Alaska Communications and its affiliates provide vital telecommunications and broadband Internet access services in not only Anchorage, Fairbanks, and Juneau but also hundreds of communities in low-density rural and Bush areas of Alaska.[2] Many of these communities are located far from any urban area, including St. Paul and St. George Islands, hundreds of miles offshore in the Bering Sea, as well as communities along the Aleutian Island chain, on the sparsely populated Kenai Peninsula, scattered across the isolated tundra and taiga of Alaska's vast interior, and in inaccessible reaches of Alaska's insular southeast coast, where they cannot be reached via the state's core road system. Even apart from these communities, Alaska Communications serves dozens of schools, libraries, and rural health care providers throughout the state that rely on the Commission's schools and libraries ("E-rate") and rural

[2] Unlike Alaska's three largest population centers, and the surrounding rural communities that are accessible on the road system, Alaska Bush communities are isolated geographically from infrastructure resources commonly available elsewhere in the state, and the nation as a whole. Most Bush communities cannot be accessed by road and are not connected to the state's power grid. To reach these communities, people, as well as goods and services, must arrive by plane, barge, snow machine, all-terrain vehicle, or other off-road transportation means. Communications services in these communities generally rely on satellite or terrestrial point-to-point microwave transport links with Anchorage, Fairbanks, or Juneau.

health care universal service support mechanisms for access to affordable telecommunications and broadband services.

To deliver the services described above, Alaska Communications relies on C-band FSS to bridge the substantial "middle mile" gap between local network facilities in remote communities, and high-capacity terrestrial networks in Anchorage, Fairbanks and Juneau, which in turn facilitate connection to the undersea fiber optic cables that connect Alaska to interstate and global communications and information networks. Alaska Communications holds a license for a network of very small aperture terminal ("VSAT") C-band earth stations throughout the state, which are linked via satellite to the company's hub earth station in Anchorage.[3] In addition, a number of Alaska Communications local exchange customers, including schools, libraries, health clinics, and small businesses, rely on C-band satellite service for vital connections to their individual customer locations.

## Discussion

As discussed below, should the Commission decide to reallocate any of the 3.7-4.2 GHz band to new terrestrial services, Alaska Communications urges that the Commission exclude from such reallocation all C-band satellite earth station facilities in the state of Alaska. The Commission should protect the band for satellite services in Alaska because C-band is essential to communications connectivity in remote areas of Alaska, and has no adequate substitute, either through terrestrial facilities or in other higher frequency satellite bands.

[3] *See* Alaska Communications Internet, LLC, Call Sign E170205.

### A. The Commission Should Preserve the 3.7-4.2 GHz Band for FSS Downlink Use in Alaska

Alaska Communications welcomes the Commission's proposal to "protect incumbent earth stations from harmful interference" from new terrestrial C-band operations.[4] As discussed in this section, nowhere is it more important to achieve that imperative than Alaska. Thus, Alaska Communications agrees with the C-Band Alliance (which includes Intelsat, SES, Eutelsat, and Telesat Canada) that Alaska should be excluded from any transfer of spectrum in the 3.7-4.2 GHz band.[5] Alaska Communications urges the Commission to modify its proposal "to permanently limit eligibility to file applications for earth station licenses or registrations to incumbent earth stations" that were registered or licensed with the Commission before the end of the current freeze period to permit applications for new earth station licenses for facilities located in Alaska, to the same extent that such applications were permitted before the freeze.[6]

#### 1. Satellite Connectivity Is Essential For Universal Connectivity In Alaska

The NPRM asks a series of questions about the value and prevalence of C-band FSS, including how intensely it is being used, and whether other technologies are available to replace it.[7] For many remote Alaskan villages, often primarily home to communities of Alaska Natives, C-band satellite communication services represent the only available alternative.[8] The challenges

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[4] NPRM at ¶ 27.

[5] *Ex Parte* Letter from Jennifer D. Hindin, GN Docket Nos. 17-183, 18-122 (filed Oct.17, 2018), at Attachment A ("Exclusion of Alaska and Hawaii—no transfer of spectrum in these regions") ("*C-Band Alliance Commitment Letter*").

[6] NPRM at ¶ 30.

[7] NPRM at ¶ 57.

[8] Alaska Communications affiliates serve as the incumbent local exchange carrier in approximately 50 communities that lack access to fiber middle mile transport. They are roughly evenly split between those that are served by terrestrial microwave transport links, and those that are connected only by satellite, which include Akhiok, Akutan, Atka, Chignik Lagoon, Chignik, Chignik Lake, Egegik, False Pass, Ivanof Bay, Kaltag, Karluk, Kokhonak, Koyukuk, Larsen Bay, Port Heiden, Nikolski, Nondalton, Nulato, Pedro Bay, Perryville, Pilot Point, Port Alsworth, Saint George, Saint Paul, and Yakutat). Well over one hundred communities, many of them home primarily to Alaska Natives, are

and costs of constructing, operating, and maintaining terrestrial broadband telecommunications facilities connecting Alaska's rural and Bush communities are of a magnitude and scope unlike anywhere else in the nation.[9] Even with substantial financial support from the federal government, many of these communities remain woefully underserved by terrestrial middle mile connections (even fixed microwave) to Anchorage, and those that do have terrestrial connections face exorbitant prices and severe bandwidth constraints.[10] Terrestrial networks simply cannot affordably reach all of the isolated villages, schools, libraries, health clinics, fishing lodges, seafood canneries, and similar outposts of humanity that dot the vast reaches of Alaska. Following the completion of new terrestrial broadband infrastructure supported by the FCC's Connect America Fund Phase II program for price cap and rate-of-return carriers, numerous communities in extremely high-cost areas still will lack affordable access to broadband, and will rely on FSS-based middle-mile service for basic telecommunications. C-band FSS is thus essential to ensuring reliable and more affordable communications connectivity to these remote communities.

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scattered across the state's vast wilderness, with populations ranging from a few dozen to a few thousand people.

[9] *See, e.g., Connect America Fund*, WC Docket No 10-90, Order, FCC 16-143, 31 FCC Rcd 12086 (2016), at ¶¶ 23-24 (discussing deployment challenges unique to Alaska); *Connect America Fund*, WC Docket No 10-90, Report and Order and Further Notice of Proposed Rulemaking, FCC 16-115, 31 FCC Rcd 10139 (2016) ("Alaskan rate-of-return carriers face unique circumstances including Alaska's large size, varied terrain, harsh climate, isolated populations, shortened construction season, and lack of access to infrastructure that make it challenging to deploy voice and broadband-capable networks. Not only do Alaskan rate-of-return carriers face conditions that are unique to the state, unlike challenges in the Lower 48, the circumstances and challenges can also vary widely from carrier to carrier depending on where their service areas are located within Alaska.").

[10] *See, e.g., Promoting Telehealth in Rural America*, WC Docket No. 17-310, Notice of Proposed Rulemaking, FCC 17-164, 32 FCC Rcd 10631 (2017), at ¶ 65 (seeking comment on whether to cap support for telecommunications services through the Commission's Rural Health Care Telecommunications Program at "the lower of the satellite service rate or the terrestrial service rate where both services are available," in light of terrestrial rates that exceed those for equivalent satellite service in Alaska).

C-band FSS is particularly important in enabling telemedicine and distance learning services, on which Alaska is uniquely dependent. Only a handful of the state's 54 school districts[11] are located in relatively dense areas such as Anchorage, Fairbanks, and Juneau on the road system; most serve rural and Bush communities that lack universal terrestrial connectivity. A review of requests for support from the Commission's Schools and Libraries Universal Service Support Mechanism ("E-rate") shows that 67 individual Funding Requests exist for school and library sites to receive E-Rate funding for satellite service in Alaska, compared to 45 such Funding Requests for microwave connectivity, 85 for copper, and 166 for fiber, highlighting that satellite middle-mile connectivity remains an important and well-used technology to support distance learning services in Alaska.

Schools in Alaska's remote communities are typically small and lack the educational resources of those in more accessible and populated areas. They may even struggle to reach the 10-student enrollment minimum to qualify for state education funding[12] making distance learning opportunities even more vital. Illustrating this point, Alaska Communications has recently requested a waiver of the Commission's current freeze on new C-band earth station applications in order to serve the ten small schools of the Kuspuk School District (which serve between 15 and 94

[11] *See* https://education.alaska.gov/DOE_Rolodex/SchoolCalendar/Home/Districts

[12] *See, e.g.,* Tegan Hanlon, "Two Small Schools in Southeast Alaska Shut Their Doors," Anchorage Daily News (Sept. 15, 2016) (reporting that public schools in Port Protection and Tenakee Springs, Alaska had failed to reach the 10-student minimum and would close, having exhausted savings that kept the schools open after enrollment declined, and observing that, "[e]ach year, two to three schools typically close in Alaska"), *available at:* https://www.adn.com/alaska-news/education/2016/09/14/two-small-alaska-schools-shut-their-doors/; Michelle Theriault Boots, "The Last Kid in Cold Bay," Anchorage Daily News (Aug. 8, 2015) (reporting school closure), *available at:* https://www.adn.com/features/alaska-news/rural-alaska/2016/12/22/the-last-kid-in-cold-bay/.

students each),[13] several of which can only be served using satellite facilities.[14] Compounding the problem, the cost of terrestrial service to those locations where it is available is substantially *greater* than that of satellite, making C-band a cost-effective option.[15]

Similarly, rural Alaskans are more dependent on tele-medicine services than any other group of Americans. Hundreds of rural health care providers[16] provide tele-medicine services that simply are otherwise unavailable due to the absence of local medical professionals. Over three-quarters of the state's doctors live in Anchorage and Fairbanks.[17] Thus, the nearest physician often is several hundred miles away and can be reached only by air, and only when possible in light of severe weather conditions. A needed medical specialist might be available only in one facility in the state, or none at all; Alaska patients frequently travel to the Lower 48 states to find knowledgeable, experienced (and reasonably affordable) medical specialists. Tribal health care facilities – common in a state where nearly half the population is Alaska Native – face limited staff and uncertain funding,[18] and their patients are as likely as not to qualify as low-income

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[13] Alaska Department of Education and Early Development, Public Schools Database, *available at:* https://education.alaska.gov/DOE_Rolodex/SchoolCalendar/Home/SchoolsList?districtId=29

[14] *See* Alaska Communications Internet, LLC, Call Sign E170205, SES-MOD-20180626-01472 (filed June 26, 2018) ("*Kuspuk Application and Waiver Request*").

[15] *See supra*, n.10. *See also Rural Health Care Support Mechanism*, WC Docket No. 02-60, *Ex Parte* Letter from Richard R. Cameron, Counsel to Alaska Communications (filed Nov. 13, 2017), at 2 (citing data showing that, in Alaska, carrier-to-carrier prices on satellite range from $1,400 to $4,000 per Mbps per month, compared to prices of over $8,000 per Mbps per month for connectivity on GCI's terrestrial fiber-microwave network, despite an $88 million construction subsidy funded by the Broadband Initiatives Program).

[16] *See* https://www.usac.org/rhc/default.aspx (data from the Universal Service Administrative Company showing 245 rural health care providers received funding commitments from the Telecommunications Program or Healthcare Connect Fund for Funding Year 2016, the last for which virtually all commitments have been finalized).

[17] *See* Alaska Physician Workforce in 2014, WWAMI Center for Health Workforce Studies, at 3, available at http://depts.washington.edu/fammed/chws/wp-content/uploads/sites/5/2015/12/Alaska_Phys_Workforce_2014_Skillman.pdf.

[18] *See, e.g.,* Letter from Colleen Meiman, Nat'l Ass'n of Community Health Centers, to FCC Chairman Pai *et al.,* WC Docket No. 02-60, GN Docket No. 16-46 (filed May 22, 2017); Letter from Jaylene Peterson-Nyren, Kenaitze Indian Tribe, to FCC Chairman Pai *et al.,* WC Docket No. 02-60, GN

families and individuals.[19] Without telemedicine services delivered via C-band FSS connectivity, many of these Alaskans would lack access to any modern healthcare services at all.

### 2. The C-Band Is Superior To Other Bands For FSS In Alaska

Particularly in Alaska, the C-band is superior to other, higher frequency bands for FSS services. Thus, the Commission should not assume that C-band satellite connectivity for critical applications, such as health care and distance learning, that require high degrees of uptime and reliability can easily be replaced by Ku- or Ka-band alternatives.

*First,* because of their large footprint, C-band satellite beam coverage is plentiful in Alaska. Alaska Communications has identified a multitude of satellites that offer broad C-band coverage across the state in Alaska.[20] Such broad coverage is facilitated by the large footprint of C-band satellite transponders, which often cover large portions of an entire global hemisphere. At higher frequency bands, such as Ku- and Ka-band, spot beam technology allows satellite operators to target coverage to large, economically important markets, such as specific cities, generally in the

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Docket No. 16-46 (filed May 24, 2017). *See generally* Alaska Native Tribal Health Consortium ("ANHTC"), "Telehealth in Alaska," available at: https://anthc.org/what-we-do/telehealth/ visited Oct. 25, 2018) ("ANTHC's telehealth services allow health care professionals to work together in the Tribal health system to provide quality care and increased access for Alaska Native people across the state. ANTHC has been on the cutting edge of telehealth services since 2001. Through telehealth video conferencing and consultation, people can remain in their home communities while giving them access to the highest quality health care providers and specialists in regional or urban centers not usually available in rural areas").

[19] *E.g.,* Letter from Nancy Merriman, Alaska Primary Care Ass'n, to FCC Chairman Pai *et al*., WC Docket No. 02-60, GN Docket No. 16-46 (filed May 24, 2017); Letter from Victor Joseph, Tanana Chiefs Conference, to FCC Chairman Pai *et al.,* WC Docket No. 02-60, GN Docket No.16-46 (filed May 19, 2017); Letter from LaTesia Guinn, Bethel Family Clinic, to FCC Chairman Pai *et al*., WC Docket No. 02-60, GN Docket No. 16-46 (filed May 1, 2017); Letter from Albert Wall, Peninsula Community Health Services of Alaska, to Senator Murkowski, Senator Sullivan & Congressman Young (dated Nov. 8, 2016, filed in CC Docket No. 02-60 on Jan. 9, 2017) (citing correspondence from Colette Reahl, MD, Kenai Medical); Letter from Bess Clark, Community Connections, to Senator Murkowski, Senator Sullivan & Congressman Young (dated Nov. 29, 2016, filed in CC Docket No. 02-6 on Jan. 9, 2017).

[20] *See* www.satbeams.com (showing C-band coverage in Alaska from a multitude of satellites, including Eutelsat (E115WB), Intelsat (Galaxy 12, Galaxy 13, Galaxy 14, Galaxy 15, Galaxy 18, Galaxy 19), SES (AMC-10, AMC-11, AMC-18), and Telesat (Anik F2, Anik F3), among many others).

lower 48 states, or transoceanic aircraft corridors. In Alaska, such coverage is generally focused on Anchorage while coverage of remote areas of the state is inconsistent, and in some cases, non-existent.[21]

*Second*, because of Alaska's high northern latitude, satellite dishes in Alaska must be set at extremely low elevation angles to receive service from geostationary orbit ("GSO") satellites located some 22,000 miles over the equator, as shown in the photograph below of a satellite dish installed near Lake Minchumina, Alaska, using support from NTIA's Broadband Technology Opportunities Program.[22] Indeed, satellite earth stations in Alaska often give the appearance of being pointed at the ground, not a satellite in orbit above:

[21] *See* ViaSat, Inc., Call Sign E110015, SES-LIC-20110211-00150,"FCC International Bureau Presentation" (Apr. 11, 2018), at 9 (ViaSat-1 Ka-band spot beam covering Anchorage), *available at:* https://licensing.fcc.gov/myibfs/download.do?attachment_key=910492.

[22] *See* Anne Neville, Director State Broadband Initiative, National Telecommunications and Information Administration, "NTIA Brings Broadband Opportunities to Alaska" (Mar. 11, 2014), *available at:* https://www.ntia.doc.gov/blog/2014/ntia-brings-broadband-opportunities-alaska (visited Oct. 24, 2018).

The Commission has long recognized that, in Alaska, the C-band offers better availability and more reliable service than higher-frequency alternatives. Over 15 years ago, as it wrestled with the goal of expanding availability of Ku-band direct broadcast satellite ("DBS") television service in Alaska, the Commission observed that, "Ku-band satellite operators typically require a minimum elevation angle of ten degrees or greater in order to provide reliable service to a particular location, although service in Alaska has often been offered at elevation angles as low as five degrees."[23] The Commission went on to cite data showing that "minimum antenna elevation angles of 5˚ for C-band, and 10˚ for Ku-band, usually are recommended."[24] In the experience of Alaska Communications, elevation angles below 10˚ in Alaska are common; its VSAT network license includes locations that require an elevation angle as low as 9˚ and points further north would be correspondingly lower.[25]

Because the state's northerly latitude necessitates such low elevation angles, rain fade and physical obstructions also play an outsize role in the availability and reliability of FSS in Alaska. Dishes pointing low to the horizon are more likely to be obstructed by trees, buildings, uneven terrain, or other obstacles, and the satellite signal must pass for a far greater distance through inevitable rain, snow, or other precipitation. As the Commission has recognized, "rain attenuation as a function of path length between the satellite and the earth station," a signal degradation problem that is compounded by low antenna elevation angles that introduce significantly higher ground noise levels.[26] As a function of geometry, these paths are longer in Alaska than anywhere else in the nation.

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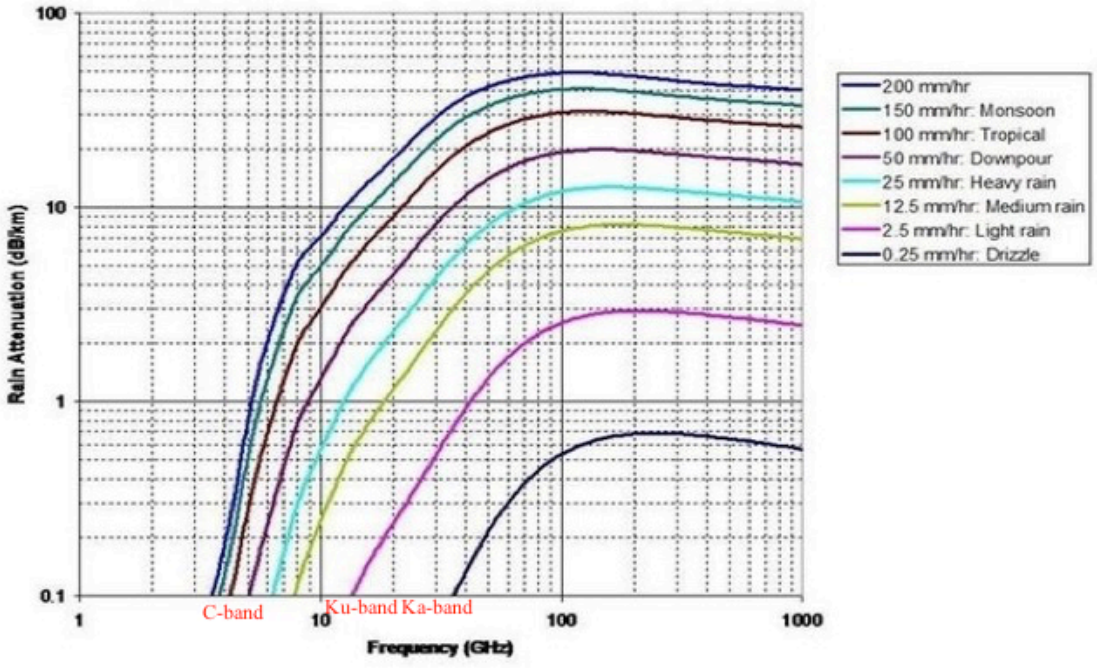
[23] *Policies and Rules for the Direct Broadcast Satellite Service*, IB Docket No. 98-21, Report and Order, FCC 02-110, 17 FCC Rcd 11331 (2002), at ¶ 55 ("*DBS Order*").

[24] *Id.* at ¶ 55, n.198.

[25] *See* Alaska Communications Internet, LLC, Call Sign E170205 (St. Paul, Alaska site).

[26] *DBS Order* at ¶ 55, n.198.

Because C-band is far more resistant to attenuation from "rain fade" than Ku- or Ka-band signals, it again is the platform of choice for service to Alaska. As the graph below shows, at Ku- and Ka-band "[a]bove 10 GHz, rain attenuation places limits on link distances" that can be achieved.[27]




At C-band frequency levels, around 4-6 GHz, rain attenuation hovers near zero, even in extremely rainy conditions, while at higher frequencies, rain attenuation rises quickly by orders of magnitude to levels that significantly impact service uptime and reliability.

### B. Sharing of the C-Band between Terrestrial Mobile and Satellite Services Would Be Extremely Difficult, and Is Unnecessary In Alaska

Alaska Communications agrees with the Commission that "co-channel sharing of spectrum between the FSS and more intensive terrestrial wireless use in the same geographic area may be

[27] *See* The Wireless Landscape, "The Mobile Innovation Grand Prix," June. 2, 2010, *available at:* http://thewirelesslandscape.blogspot.com/2010/06/mobile-innovation-grand-prix.html (visited Oct. 24, 2018).

difficult."[28] Moreover, even partitioning the band between terrestrial mobile service and FSS raises significant challenges. As discussed below, neither would serve the public interest in Alaska.

### 1. C-band Satellite Downlink and Terrestrial Mobile Services Cannot Share the Same Spectrum In Close Proximity

The propagation and interference characteristics of the 3.7-4.2 GHz band mean that it is infeasible for new terrestrial mobile services to operate in close proximity to co-frequency FSS satellite earth station receivers. In the NPRM, the Commission discusses a hypothetical 20-kilometer exclusion zone around each earth station that was then licensed or registered in the International Bureau Filing System, and found that the exclusion zones would cover 83.25 percent of the U.S. population.[29] In fact, the issue is far more difficult. Not only have thousands of additional C-band earth stations been registered since the publication of the NPRM,[30] but, multiple studies have shown geographic separation far greater than 20 kilometers would be required.[31]

The impact of such interference would be especially acute in Alaska. In Alaska, earth station elevation angles are often on the order of 15 degrees or less, far lower than they are in the United Kingdom or Virginia where those interference studies were conducted, and that

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[28] NPRM at ¶ 50.

[29] NPRM at ¶ 51.

[30] *See* Public Notice, "International Bureau Announces Two-Week Extension of Filing Window for Earth Stations Currently Operating In 3.7-4.2 GHz Band," GN Docket No. 18-122 (Int. Bur. rel. Oct. 17, 2018) (extending the C-band filing window due to a "large influx of earth station applications").

[31] SES Americom has found that terrestrial mobile 5G base stations and incumbent satellite earth stations in Virginia with elevation angles ranging from 19 degrees to 39 degrees require separation of between 65 and 75 km, *see Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, *Ex parte* Letter from Gerry Oberst, President, SES Americom Inc. (filed Mar. 2, 2018), Technical Annex at 6. This result was consistent with a sharing study commissioned by the United Kingdom's Ofcom that found required separation in the U.K. of up to 70 km, *see* Transfinite Systems Ltd., *Geographic Sharing in C-band - Final Report* (May 31, 2015), at 42, *available at:* https://www.ofcom.org.uk/research-and-data/technology/radio-spectrum/c-band-sharing (visited Oct. 29, 2018) ("*Ofcom Study*").

difference increases the potential for interference between terrestrial mobile 5G and FSS services, because earth stations in Alaska point that much lower toward the horizon, where terrestrial services operate.[32] Moreover, as discussed above, FSS is the sole means of communication for many of the more than 170 primarily Alaska Native communities that dot Alaska's inaccessible coastlines, remote islands, and inaccessible interior. Continued reliable performance of the 3.7-4.2 GHz band for FSS not only improves economic, educational, and healthcare opportunities in these communities but, in a healthcare emergency, literally can mean the difference between life and death.

The effects of interference in the 3.7-4.2 GHz band are compounded because C-band satellites operate using hard-coded frequency pairs for uplink and downlink operations. Thus, interference at one location that precludes an earth station from receiving a particular downlink frequency in the 3.7-4.2 GHz band also affects a distant terminal's ability to transmit to that earth station on the corresponding uplink frequency in the 5.925-6.425 GHz band.

An alternative to geographic separation, partitioning of the 3.7-4.2 GHz band raises different concerns that are still difficult to overcome. Any partitioning of the band between terrestrial mobile services and incumbent users would require "repacking" of incumbent C-band FSS services into the portion of the spectrum that remains available for FSS use. Because C-band transponders cover substantial portions of the entire hemisphere, that exercise would impact users across North and South America, and could leave inadequate spectrum to provide all essential services.

[32] *Ofcom Study* at 39 (observing that "[l]ow elevation operation in the direction of a proposed IMT network will generate the worst case").

Furthermore, high-power terrestrial signals anywhere in the 3.7-4.2 GHz band would saturate the low noise block ("LNB") downconverter that C-band earth stations currently use, and could preclude an FSS earth station licensees from using *any portion* of that band unless and until it replaces each LNB with one that does not receive the affected frequencies.[33] It would likely be necessary in many cases to replace the LNB downconverter completely with one that receives only the unaffected portion of the band. And, with less spectrum available for the incumbent FSS and fixed services, there may be locations where it is no longer possible to coordinate all of incumbent licensees' services.

**2. Additional Spectrum Is Not Needed to Meet Alaska's Mobile Wireless Needs**

In the NPRM, the Commission seeks comment on alternative mechanisms for expanding terrestrial mobile use of the C-band.[34] To the extent that the Commission proceeds with a partitioning of the band, it should do so in a dynamic way that takes into account the needs of particular geographic areas for new terrestrial mobile spectrum. While the nation's largest and most densely populated cities may have greater and more urgent needs for increased spectrum resources, making it economically efficient to compensate C-band FSS incumbents for their costs of vacating the band, there may be far greater public interest value in protecting the C-band for FSS in other areas with sparser populations and fewer terrestrial options.

Alaska's small population and low population density mean that there is far less need for deployment of additional capacity, or buildout of new spectrum resources, to "densify" mobile broadband networks in the face of growing demand, than there is in the nation's more densely

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[33] *See Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Comments of General Communication, Inc. (filed Oct. 2, 2017), at 12 (observing that, "the presence of even small amounts of external, intentional radiator energy can easily overwhelm the input signal limits of a [low-noise amplifier] and saturate it," impairing the ability of the earth station to effectively receive any signal).

[34] NPRM at ¶¶ 58 *et seq.*

populated regions. Alaska has a population of about 740,000 people, only slightly greater than that of the District of Columbia, yet the state encompasses about 1/6 of the total land area of the nation, larger than the area of 22 other states combined.[35] Of that total, about 300,000 – some 40 percent – living in Anchorage and over 130,000 more live in the Fairbanks North Star and Juneau boroughs (roughly equivalent to counties in the lower 48 states).[36] Even in Anchorage, the population density is about 171 persons per square mile, far lower than that of the nation's large urban centers, where population densities can range up to 4,000 persons per square mile or higher.[37] Outside of those three population centers, Alaska's population density falls to about one person for every two square miles.

As a result, spectrum resources for terrestrial mobile services in Alaska are far less constrained than they are in the nation's large urban centers, where 5G services using newly-allocated spectrum are expected to make their debut. As shown below, at least two nationwide mobile wireless providers, Sprint and T-Mobile, have not even entered the Alaska market, except

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[35] *See* United States Census Bureau, State Area Measurements and Internal Point Coordinates, *available at:* https://www.census.gov/geo/reference/state-area.html (visited Oct. 29, 2018) (showing the area of Alaska is greater than that of North Carolina, New York, Mississippi, Pennsylvania, Louisiana, Tennessee, Ohio, Virginia, Kentucky, Indiana, Maine, South Carolina, West Virginia, Maryland, Vermont, New Hampshire, Massachusetts, New Jersey, Hawaii, Connecticut, Delaware, Rhode Island – and the District of Columbia – combined).

[36] *See* United States Census Bureau, Quick Facts, *available at:* https://www.census.gov/quickfacts/fact/table/dc,juneaucityandboroughalaskacounty,fairbanksnorthstarboroughalaska,anchoragemunicipalityalaska,ak/PST045217 (visited Oct. 22, 2018) (showing District of Columbia, Municipality of Anchorage, Fairbanks North Star Borough, Juneau City and Borough, and Alaska state totals).

[37] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 17-69, Twentieth Report, FCC 17-126, 32 FCC Rcd 8968 (2017), at ¶ 45 (citing, as evidence of densification, the fact that, between April 2016 and April 2017, the "average number of tower sites per county increased from 584 to 815 in the most densely-populated counties, with a population density of over 4000 people per square mile").

through roaming partners, despite holding the required licenses for decades.[38] Rather, those providers have chosen to enter into roaming arrangements with GCI Liberty, a wireless service provider with an extensive Alaska network.

## Coverage in Alaska (State of 273 Zip Codes)

| Network | Zip Codes Covered | Percentage | Geographic Area Covered $m^2$ |
|---|---|---|---|
| AT&T | 86 | 4.62% | 47,893 |
| Verizon | 56 | 1.43% | 27,168 |
| T-Mobile | 0 | 0% | 0 |
| Sprint | 0 | 0% | 0 |

Coverage data generated July 27th, 2018 from carrier maps

Source: https://www.whistleout.com/CellPhones/Guides/Best-Coverage-in-Alaska-USA (visited Oct. 29, 2018).

Even in the lower 48 states, new terrestrial mobile services are unlikely to consume the entire 3.7-4.2 GHz band. Most nations around the world that are considering use of this band for more intensive terrestrial use have proposed to reallocate about 100-200 MHz from the extended C-band or the lower end of the conventional C-band, generally no higher than 3.8 GHz.[39] In

[38] Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No 18-197 (filed Jun. 18, 2018), Appendix L (spectrum aggregation analysis showing substantial 600 MHz, 800 MHz, PCS, AWS, PCS and 2.5 GHz spectrum holdings in Alaska among the companies that are parties to the merger), at 16 (Anchorage), 21-22 (Fairbanks, Juneau, and numerous smaller communities).

[39] *See, e.g.,* EC Decision 2014/276/EU, "Commission Implementing Decision of 2 May 2014 on amending Decision 2008/411/EC on the harmonisation of the 3400 - 3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community, OJ L 139/18 (14 May 2014), at 20 (European Commission decision implementing expanded terrestrial mobile use of the 3.4-3.8 GHz band); Ofcom, *Statement on Improving Consumer Access to Mobile Services at 3.6 GHz to 3.8 GHz* (rel. Oct. 26, 2017) (*available at:* https://www.ofcom.org.uk/__data/assets/pdf_file/0019/107371/Consumer-access-3.6-3.8-GHz.pdf) (reallocating 3.6-3.8 GHz spectrum to terrestrial mobile use); Danish Energy Agency, "Consultation for the 1.5 GHz, 3.5 GHz and 26 GHz Frequency Bands," J. No. 2018-15059 (issued July 11, 2018)

Alaska, the need for new spectrum is far lower. To the extent that additional mobile wireless capacity is required in Alaska, there is still great potential to do so using currently-available allocations of spectrum resources, rather than by expanding into new bands. Finally, it seems fundamentally unfair to deny C-Band service to hundreds of remote locations in Alaska for the potential, but likely unnecessary, benefit of residents in urban Alaska.

### C. If the Commission Introduces New Terrestrial Services in the 3.7-4.2 GHz Band, Incumbent Earth Station Licensees Should Receive Appropriate Compensation

In the NPRM, the Commission seeks comment on three alternative mechanisms for implementing a transition to more intensive terrestrial use of the 3.7-4.2 GHz band, including a market-based transition managed by a private-sector facilitator,[40] an auction,[41] or an hybrid mechanism that would combine elements of each.[42] Recently, the C-Band Alliance, comprised of Eutelsat, Intelsat, SES, and Telesat Canada, has submitted a proposal to act as the facilitator for one version of a market-based mechanism under the first alternative. [43]

Again, Alaska Communications believes that no such C-band transition should occur in Alaska, and urges the Commission to exclude the state from any reallocation of C-band spectrum to terrestrial mobile use. To the extent the Commission proceeds with a transition in Alaska, however, Alaska Communications urges the Commission to ensure that incumbent earth station licensees receive compensation, not only for the costs of mitigating interference or relocating

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(available at: https://ens.dk/service/hoeringer/hoering-over-interessen-frekvenser-i-frekvensbaandene-35-ghz-26-ghz-og-15-ghz) (examining 3.4-3.8 GHz band for terrestrial mobile use); Singapore Infocomm Media Development Authority, Consultation Paper, "5G Mobile Services and Networks (rel. May 23, 2017) (*available at:* https://www.imda.gov.sg/-/media/imda/files/inner/pcdg/consultations/consultation-paper/public-consultation-on-5g-mobile-services-and-networks/5g-public-consultation.pdf) (examining 3.4-3.6 GHz band for terrestrial mobile use).

[40] NPRM at ¶¶ 66-97.

[41] NPRM at ¶¶ 98-110.

[42] NPRM at ¶¶ 111-115.

[43] *See C-Band Alliance Commitment Letter.*

facilities, but also for the disruption of their businesses and potential failure to meet contractual obligations, and the economic surplus generated as a result of the transition.

**1. Costs of Mitigation Will Be High**

As discussed above, given the necessary geographic separation between terrestrial mobile base stations and incumbent FSS earth stations that use the 3.7-4.2 GHz band today, there appears to be little opportunity for sharing, other than through physical or spectral separation of the services. New terrestrial mobile operations would otherwise create harmful or debilitating interference to satellite downlink receive operations, interrupting service to customers or rendering it unreliable. Some of these costs are discussed as follows:

*Interference Mitigation.* C-band gateways and customer terminals have fixed capabilities set to particular frequencies that cannot be easily adjusted among C-band, Ku-band or other FSS bands. Reallocation of the entire 3.7-4.2 GHz band, either outright or through "sharing" rules that effectively preclude continued use of the band by other services, could obligate incumbents to abandon the C-band and replace all of their associated equipment. Needless to say, this would be an extremely costly and time-consuming process.

Even a partitioning of the band between terrestrial mobile 5G services on the one hand, and the incumbent FSS and fixed microwave services that operate today on the other, would impose substantial costs. As discussed above, LNB saturation issues could necessitate the costly replacement of every affected LNB downconverter, lest high-power terrestrial 5G mobile base stations *anywhere* in the 3.7-4.2 GHz downlink spectrum prevent the *entire band* from being used for satellite operations.

These efforts would be particularly costly in Alaska. Remote satellite earth station customer terminals are invariably located in remote areas of the state where Alaska Communications does not have any permanent presence of operations, maintenance, or repair

technicians, meaning that, to change or adjust any equipment at a remote village in the Alaska Bush, there are considerable mobilization costs. Maintenance and repair calls that could be accomplished in hours in the lower 48 states may consume days or weeks in Alaska, requiring travel by airplane, boat, barge, all-terrain vehicle, or snow machine to locations that are inaccessible by road, when weather permits access at all. Air freight charges for any necessary equipment, parts, or tools drive costs still higher.

*Relocation of Facilities:* Gateway earth station hub facilities are typically large installations with multiple satellite transmit and receive antennae. They are located at sites chosen after extensive analysis of the spectrum environment and careful coordination with other licensees. Environmental protection, historical preservation, zoning, permitting, land use, and other planning processes are lengthy and costly to complete, and the specialized equipment is costly to purchase and install.

In the case of Alaska Communications, its earth station hub is located in Anchorage, where it can connect to its core terrestrial communications network in Alaska, as well as undersea cables that reach the lower 48 states. Anchorage is not a particularly dense urban area, and existing spectrum allocations appear sufficient to meet its 5G mobile broadband needs for the foreseeable future. Introduction of these new services in the vicinity of this hub utilizing the 3.7-4.2 GHz spectrum would likely require the physical relocation of these capital-intensive facilities, as well as potential deployment of new fiber optic cables to serve the new location, and the transfer or replacement of specialized staff. That process of physically relocating the multiple large earth station antennae present at a single gateway, as well as the associated specialized staff and equipment, would be particularly costly and time consuming.

### 2. A Compensation Mechanism Should Be Available to Incumbent Licensees

In evaluating whether to permit introduction of new terrestrial 5G mobile services in the 3.7-4.2 GHz band, and in light of the extraordinary costs discussed above, the Commission should consider a mechanism to compensate incumbent licensees for the costs they will incur to mitigate interference, relocate their facilities or earth station operations, or abandon their businesses altogether. Such compensation would ensure that the decision to undertake the transition to terrestrial mobile 5G broadband services in this band is, in fact, economically efficient: if the highest and best commercial use of this spectrum is to provide terrestrial mobile broadband services, then it will prove economically rational to compensate the incumbents to vacate the band.

Having received the licensed right to use the specified spectrum for a defined term, a licensee may reasonably expect that license to provide sufficient predictability and certainty during that term to permit it to invest capital, develop business, and incur contractual obligations with customers. If new entrants or new technologies have emerged that create superior public benefits or opportunities for economic growth, then the Commission should create a transitional mechanism following the expiration of that license term, or compensate the incumbent for the costs it incurs to make way prematurely for the new entrants, including the costs of abandoning, relocating, or modifying sunk capital facilities, and breaking or restructuring their contractual commitments.

The Commission has established precisely these sorts of compensation mechanisms in similar circumstances previously. For example, when the Commission reorganized the 800 MHz band to accommodate the communications needs of first responders and other emergency services, it established a Transition Administrator to oversee the distribution of funds for service reconfiguration and spectrum relocation costs incurred by incumbents.[44] More recently, the

[44] *See, e.g., Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, FCC 04-168, 19

Commission designed its Broadcast Incentive Auction according to this principle, under which mobile broadband service providers and UHF broadcasters participated in an integrated "forward" and "reverse" auction process, in order to identify opportunities for economically efficient reallocation of 600 MHz spectrum. The auction proceeds will both compensate broadcasters that return some or all of their broadcast spectrum usage rights and reimburse remaining broadcasters and multichannel video programming distributors ("MVPDs") for their costs of more efficiently "repacking" into alternative broadcast channels, while also yielding proceeds to be deposited in the U.S. Treasury.[45] As the Commission explained, "Our central objective in designing this incentive auction is to harness the economics of demand for spectrum in order to allow market forces to determine its highest and best use."[46] The Commission should similarly establish a mechanism to compensate incumbents 3.7-4.2 GHz licensees, in order to ensure that the Commission has indeed identified the "highest and best use" of this valuable spectrum.

The C-Band Alliance's proposal to facilitate market-based transactions to clear C-band spectrum more quickly based on market demand has potential. To the extent that the

FCC Rcd 14969 (2004), at ¶¶ 177-178 ("Band reconfiguration will be costly . . . . Under the band reconfiguration plan, the principal cost component will be borne by Nextel, which will pay for all channel changes necessary to implement the reconfiguration. Nextel is obligated to ensure that relocated licensees receive at least comparable facilities when they change channels.").

[45] *See generally Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, FCC 14-50, 29 FCC Rcd 6567 (2014) ("*Broadcast Incentive Auction Report and Order*"), at ¶¶ 25-26 (describing forward and reverse auctions), ¶ 35 (describing procedures to reimburse costs reasonably incurred by television stations that are reassigned to new channels in the repacking process, as well as by MVPDs to continue to carry such stations); *Post-Incentive Auction Transition*, MB Docket No. 16-306, Public Notice, "Incentive Auction Closing and Channel Reassignment Public Notice," DA 17-314, 32 FCC Rcd 2786 (2017), at ¶ 2 ("Proceeds from the forward auction*, i.e.*, winning bids net of credits for rural service providers and small businesses, total $19,318,157,706, with 50 bidders placing winning bids for a total of 2776 licenses. The winning bids in the reverse auction total $10,054,676,822. After covering reverse auction winning bids, reimbursement payments of up to $1,750,000,000 for eligible broadcasters and MVPDs, and costs of conducting the incentive auction, forward auction proceeds totaling at least $7,306,480,884 will be used to reduce the Federal deficit.").

[46] *Broadcast Incentive Auction Report and Order* at ¶ 2.

Commission adopts such a proposal, however, the Commission should ensure that any economic surplus that is generated above and beyond the costs of mitigating the impacts on providers of C-band FSS is appropriately allocated among satellite operator licensees, satellite earth station licensees, and the U.S. treasury.

## Conclusion

For the foregoing reasons, the Commission should exclude Alaska from any change in its rules to foster more extensive use of the 3.7-4.2 GHz band for terrestrial mobile services. Because it is infeasible for terrestrial mobile services to operate in this band in the same geographic areas as co-channel incumbent FSS, permitting such use would disrupt essential services throughout the state of Alaska that cannot feasibly be transferred to other bands. To the extent that the Commission nevertheless decides to authorize new uses of the 3.7-4.2 GHz band, it should adopt safeguards to protect incumbent FSS operations, and establish a compensation mechanism to reimburse incumbent operators for the costs they incur in accommodating new terrestrial mobile entrants.

Respectfully submitted,

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